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Research Report

The esthetic preference of Chinese typefaces – An event-related potential study

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ABSTRACT

Emotional stimuli such as pictures, logos, geometric shapes, etc can evoke human esthetic preference from previous neuroesthetic studies. Chinese characters can be considered as emotional stimuli as they have an important property: typeface. Intuitively, the emotional meaning of Chinese characters can cause esthetic preference. However, whether a typeface can cause esthetic preference or not from an empirical perspective is still unknown. To address this issue, participants' event-related potential (ERP) waves are recorded while they are presented a series of Chinese characters in different typefaces. Participants are asked to distinguish specific target from the others. Afterwards, from the Chinese characters presented in this task, participants are asked individually to select the characters they like the most and dislike the most. By recording the ERP responses (a response of implicit preference to Chinese characters themselves) during the experiment to different typefaces of Chinese characters, we find a significant difference between disliked and all characters in the frontal–central area in the 200–300 ms window after the stimulus' onset. In the 400–600 ms window, after the stimulus' onset, a significant bias for disliked characters emerges in frontal, central, parietal and occipital areas. Our results suggest that people could make a rapid, implicit esthetic preference for the typefaces of Chinese characters.

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1. Introduction

"Had I been born Chinese, I would have been a calligrapher, not a painter."

Pablo Picasso

Typeface, as an important characteristic can be represented by different styles, such as standard computer font, handwriting, and master piece by great calligraphers. Intuitively, to read is not only to understand the meaning of a word, but also to see the typeface of the word itself. According to some neuroesthetic studies, some daily stimuli such as logos, pictures and geometric graphs could trigger human implicit esthetic preference, even in the absence of an evaluation and decision-making guide (Bargh and Ferguson, 2000; Höfel and Jacobsen, 2007a; Handy et al., 2010). In addition, the emotional meaning of a word can evoke our esthetic preference. However, whether the typeface, as an

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Fig. 1 – One hundred and seventy-five non-target Chinese characters.

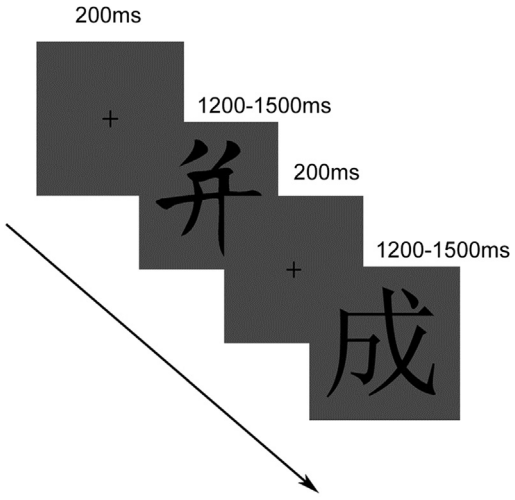

Fig. 2 – Two sample trials with different stimuli. A fixation point appears at the center of the monitor screen randomly from 1200 to 1500 ms. Then a stimulus appears for 200 ms.

important word characteristic, can cause our implicit esthetic preference or not is still unknown from a scientific view.

Most of the previous neuropsychological studies mainly focus on semantic processing and influence of lexical meaning on human cognitive processing (Brown and Hagoort, 1993; Chua, 1999; Chwilla et al., 1995; Connolly and Phillips, 1994; Dehaene, 2009; Fiez and Petersen, 1998; Hagoort et al., 2004; Halgren et al., 2002; Seidenberg and McClelland, 1989; Trueswell et al., 2002). Some recent studies have paid attention to a word's typeface and investigate the influence of different typeface (Barton et al., 2010; Hellige and Adamson, 2007). For example, Barton finds that patients with right lateral fusiform damage were impaired in completion times and/or accuracy when sorting for script style, but performed better when sorting for word identity. Another study proves that those right-handed participants observed handwritten letters, and the handwritten letters can cause a significant reduction of neural circuits' excitability in the motor corticospinal pathway. (Nakatsuka et al., 2012). These studies indicate that different word typefaces could influence human perception and cognition processing. However, none of the previous studies investigate the influence of typeface from the aspect of human esthetic preference.

We investigate Chinese word typeface from an esthetic aspect in this paper. Our hypothesis is that people can make a rapid, implicit esthetic preference to the typefaces of Chinese characters. Esthetic preference is a special cognitive process of stimuli that process stimuli in hierarchical sequence and reveal in some forms of neural responding (Brázdil et al., 2009; Cela-Conde et al., 2013; Farah, 2000; Shimamura and Palmer, 2012; Thakral et al., 2012; Zeki, 1993).

Event-related potentials (ERPs) are a non-invasive technology that has high resolution in time course. The advantage of using ERP technology to investigate esthetic preference is that its high temporal resolution can help us investigate the fast cognitive response to the stimuli. Besides, ERP components are reliable index that can reflect different stages of cognitive processing. Several components in ERP waves have been proved to be modulated by emotional stimuli even when participants perform a passive viewing task without an introduction to evaluate the stimuli (Hajcak et al., 2009; Junghöfer et al., 2001; Rozenkrants and Polich, 2008; Schupp et al., 2004; Schupp et al., 2006). In 2000, Jacobsen et al. made the first ERP experiment on human esthetic judgment (Jacobsen and Hofel, 2001). Their experiment shows that the ERP waves for non-esthetic geometric figure are more negative than esthetic geometric figure in the time window between 300 and 400 ms in frontal area. Since then many researchers use ERP technology to investigate the esthetic preference of stimuli (de Tommaso et al., 2008; Handy et al., 2010; Müller et al., 2010). However, to the best of our knowledge, the work we present in this paper will be the first one to investigate the esthetic preference of Chinese typefaces by using ERPs.

In our experiment, participants' ERPs are recorded while they are presented with a series of Chinese characters in different typefaces and the same target Chinese character. The target Chinese character is presented 10 times in a trial. Participants are asked to give a key response to target stimuli in the trials, and they are simply introduced to identify the target stimuli within task. After task, participants are asked to select 12 Chinese characters they like the most (like-characters) and 12 they dislike the most (dislike-characters). The selections of the most liked and disliked Chinese

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